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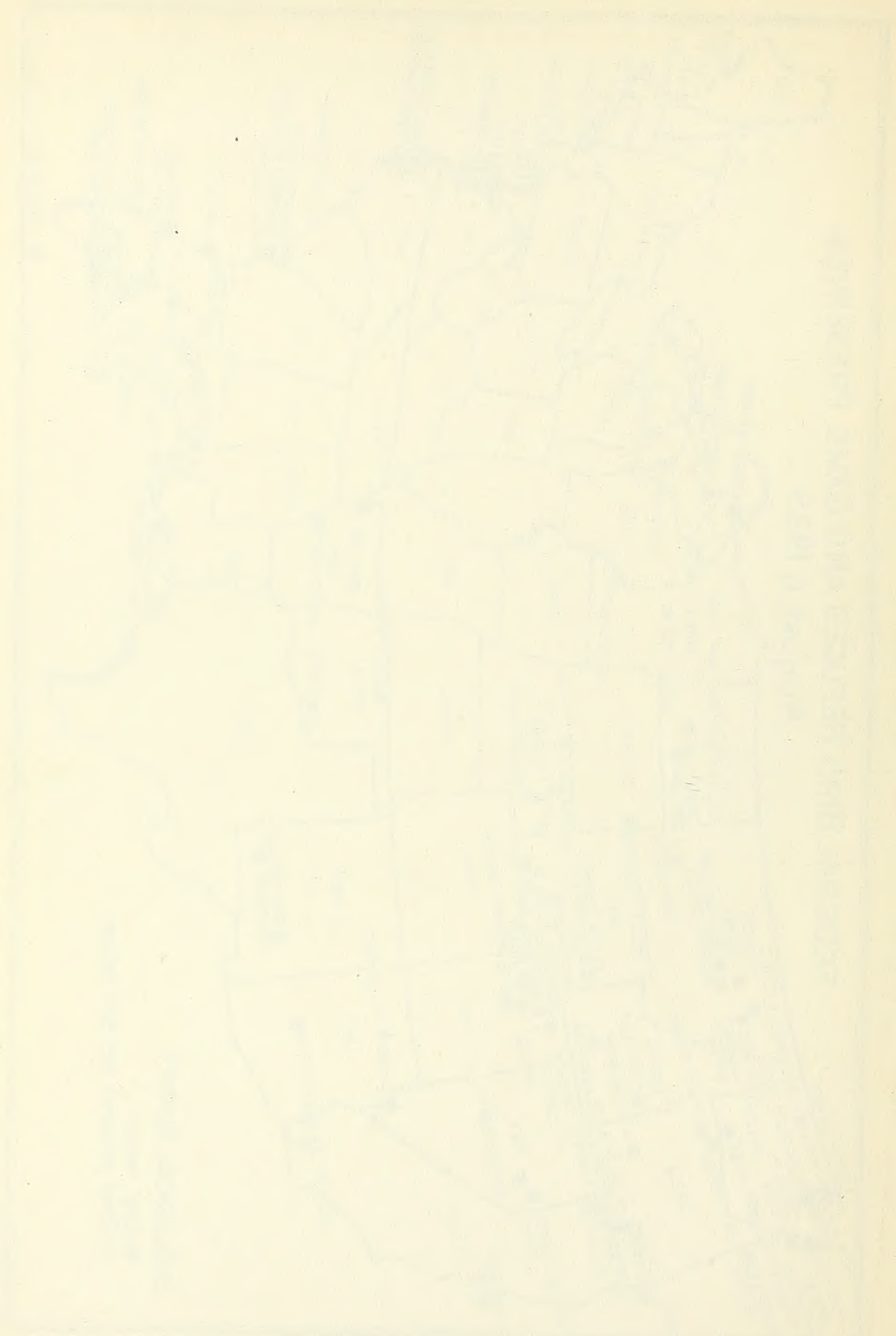

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WILDLIFE OF THE ATLANTIC COAST SALT MARSHES

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NOTE: This leaflet is intended primarily for educational use in CCC camps engaged in mosquito-control work in Atlantic-coast salt marshes. It is issued in this form as a preliminary to publication with illustrations. Suggestions as to additional matter that might be incorporated in the formal publication and as to method of treatment will be appreciated.

INTRODUCTION

Salt marshes reach their best development where the coast has long been slowly sinking. Their extent indicates the degree to which low-lying shores and the estuaries of streams are being "drowned". It does not take a highly skilled engineer to make convincing observations as to the sinking of the Atlantic coast. Anyone seeing stumps of trees standing well out in salt water, in some cases 10 to 15 feet under low tide, knows that where they grew was once dry land, and that either the sea has risen or the land fallen, the latter seeming by far the more likely supposition. Such groups of stumps standing in natural position, just as they would in a clearing, may be seen at numerous points along the Atlantic coast. Another evidence of sinking is the channels of streams which extend far seaward under water where they could not have been cut except when the bottom in that quarter was marsh.

Engineers have measured the subsidence of the Atlantic coast and obtained results indicating a sinking of about a foot in a hundred years. This seems no cause for alarm, but if continued it may in time have serious consequences for many coastal cities. The case shows well, however, how Nature may work on a much larger scale than man. Man puts up great buildings at some of the lowest points on the coast, then marvels at his own works, while Nature in time may render them as naught through gradually and quietly letting down more than a thousand miles of coast line.

ZONES OF SALT MARSH PLANTS

This sinking, as stated in the beginning, is a great aid to the formation of extensive salt marshes. As the ocean slowly creeps up on the land salt water kills ordinary land plants. Their place is taken by others that can endure a slight amount of salt in the soil and live through occasional overflows of brackish water. Such plants occupy the inner beach zone, further details concerning which are given later. Just outside of this zone, where the soil is a little wetter and there are small channels and sometimes ponds, is the marsh-hay zone. Finally, where salt water stands continuously and there are large channels or guts, lakes, or lagoons, comes the tall cord or thatch grass. Such are the chief parts and plants of the Atlantic-coast salt marshes. The extent of these zones depends on the amount of tide. On the northern Massachusetts coast it is estimated that the vertical scope of the zones is: Beach, 1 foot; marsh hay, 2 feet; and cord grass, 6 feet.

The zones of salt-marsh plants are not stationary, but rather may be regarded as ceaselessly shifting. To illustrate by a more familiar example, consider that in and about shallow fresh-water lakes similar zones of vegetation may be seen, dependent in this case chiefly on the water level in relation to the soil in which plants are rooted. In many cases, as is well known, the lakes are filling up. We see that the under-water plants help to anchor the muck and by catching silt and adding their own remains annually to the bottom mud, thicken and build it up, so that bulrushes and cattails can get a foothold. These increase and again, by filling the soil with roots and accumulating more silt, harden the bottom and shallow the water another degree so that various sedges and grasses come in. They continue the process, enabling alders, other bushes, and finally trees, to occupy a land area that once was water.

Applied to the salt marsh the process may be visualized as the catchment of fine sediment by eelgrass and wigeongrass in quiet places, building up the bottom to the point that cordgrass can grow. This then occupies the soil with its dense and resistant root systems, entraps more mud, and holds the debris from its own annually worn-out stems. As this new foundation for plants approaches the mean high-tide level, the marsh-hay types of plants take hold. They build again by catching sand washed in from the sea, and loam coming down from the land. Then the high-tide bushes may get a start, further firm the soil, and make place for such bird-borne plants as bayberry and wild rose. An island then is well on its course of development, and if man does not run fire or graze cattle over the area, it may become clothed with trees. Where the coast is sinking, however, building up must be only a preliminary to tearing down, and as the various zones of the marsh work inland any islands formed, even if forested, must give way. When salt water kills their vegetation and the protecting belt of marsh moves landward, the wash of open water soon wears the islands down. All this is a slow, a very slow movement, however, and in a lifetime men may see of it only a step or two.

PLANTS OF THE ZONES AND THEIR VALUE TO WILDLIFE

Water areas--the pools, the ponds, and the lagoons--of the Atlantic-coast salt marshes support, besides algae, or the seaweed group of plants, eelgrass north of Beaufort, N. C., turtle grass and manatee grass on the Florida coast, and wigeongrass all the way.

Eelgrass

Eelgrass has narrow, tapelike, dark green leaves growing from a jointed reddish rootstock, and its small barrel-shaped seeds are borne in thin pods enclosed by the bases of the leaves. It inhabits a considerable range of depths, and in some cases is left bare at low tide. In general it thrives best in water in which there is considerable tidal movement. It is a good wild-fowl food plant, and, being the chief dependence of sea brant, its scarcity in recent years, due to a disease, has had an unfavorable effect on the numbers of that bird. Eelgrass is eaten to a considerable extent also by the Canada goose, and its seeds by the black duck; it is taken in smaller quantity also by a variety of other waterfowl. The plant is known under a number of local names, as saltwater grass, seagrass, seawrack, and seahay. The last two names refer to the windrows of it cast up on the beach, particularly by winter storms. It dries and bleaches there and is used as bedding for domestic animals, and for insulation and packing. When plentiful it has been harvested in large quantities for commercial purposes. The fluffy dry "sea hay" is recognized as good nest-building material both by birds and mammals.

Manatee and Turtle Grasses

Manatee grass and turtle grass are less conspicuous plants, growing near the bottom of the bays and creeks of the Florida coast. Their value as food for wildlife is not scientifically known, but the common names indicate that they have a popular reputation in that respect.

Wigeongrass

Wigeongrass has long threadlike leaves, arising from a whitish, rather zigzag rootstock. The small black triangular seeds are borne singly on the tips of short stalks radiating from the end of a more or less lengthy and spiral stem. Wigeongrass grows in varying depths of water, sometimes in a few inches near the shore, sometimes at a depth of 10 feet or more. It is typically an inhabitant of brackish water, but grows also in that which is nearly fresh and, at the other extreme, in lagoons concentrated by evaporation to a salinity greater than that of the sea. It is also adapted to strongly alkaline waters of the West, in which no other plants will grow. It is a wild-fowl food of the first rank, and all parts of it are eaten.

Cordgrass

Cordgrass, or thatchgrass, occupies deeper water than any of the other salt-marsh plants, except the strictly submerged eelgrass and wigeongrass, and makes up nine-tenths or more of all of the vegetation of its zone. This grass extends in depth from the level of ordinary high tide nearly to that of mean low tide. Consequently a considerable part of its total height is submerged at high tide. Cordgrass is a true grass, not a "called" one like those just referred to. It has a rather stiff, leafy, stalk, as much as 10 feet tall, a flowering and fruiting head composed of featherlike parts, and a wiry rootstock. Cordgrass is sometimes used for bedding or mulch. It has little food value for wildlife but makes good cover for rails and smaller birds, some of which nest in it, especially where bunches of dry eelgrass or other drift have lodged.

Blackgrass

Areas inside the cordgrass zone that are not covered by ordinary high tides but are subject to flooding by spring and other exceptionally full tides, have a variety of vegetation, in which at different points blackgrass, bulrushes, cattails, or marsh hay may predominate. Blackgrass, so called from its very dark-green color, which is almost black in fall, slender and needle-pointed at the top, with a tuft of flowers or seeds at the side, makes large and dense stands, but nevertheless permits the growth of numerous other salt-marsh plants within its domain. It is of no value as a food plant.

Bulrushes

Bulrushes of the salt marsh have triangular stems and tufts of flowers or seeds near the top. In the so-called three square, without leafy stems, these tufts are lateral, and in the larger leafy-stemmed bulrushes they are terminal. From them can be ground out in the palm large numbers of shiny brown seeds. These are eaten freely by waterfowl and in some localities are an important food supply. Bulrushes are a favorite food of muskrats and are used also as material for winter houses of these animals.

Marsh Hay

Marsh hay is a term that covers a slender cordgrass, salt grass, and a few other species, a striking characteristic of which, after it has attained a height growth, is a "lodged" appearance, as if some force had flattened it. A variety of other plants may be scattered about in this zone of the salt marsh, and here more birds nest than elsewhere. Flowers that may attract attention are the marsh rosemary, with its delicate sprays of tiny lavender blossoms, growing all the way along the coast; and sea ox-eye, with buttonlike heads, yellow in flower, purplish-brown in fruit, from Virginia southward. The seeds of some of the plants, such as those of salt grass and small sedges among the marsh hay, are sometimes eaten, but with one exception they are not known to be of much value. The exception is arrowgrass, a plant with fleshy leaves at base and a slender stalk bearing three-parted green fruits, sometimes locally important as food for wild ducks. In some periods of our history salt-marsh hay has been of importance and was thriftily harvested, but now it appears to be little used.

Saltwort

A salt-marsh plant sure to attract attention is one with fleshy, watery-looking, jointed stems, which grows in places made so salt by repeated flooding and evaporation that they are bare of other vegetation. This saltwort, picklegrass, or samphire, is pale green in summer, but turns scarlet in fall. Locally its seeds may be important as food for wild ducks, and the fleshy parts are said to be cropped by wild geese.

Other Vegetation

The zone of transition from marsh to upland vegetation contains such things as marsh mallow with pink flowers some inches across, the high-tide bush covered in fall with the glistening white parachute hairs of its seeds; switch grass, the seeds of which are a bird food; orach; and seaside goldenrod. The leaves of orach, arrowhead-like, and those of the seaside goldenrod, lance-shaped, are also somewhat thickened, a characteristic of many salt-tolerating plants. The orach may be browsed by geese, or its seeds eaten by various birds, but the goldenrod is not known to be used.

Salt marshes may at first glance seem monotonous, but they have a variety and play of color not lost on the attentive observer. In summer the cordgrass is light green, the marsh hay darker, and the blackgrass very dark. In fall all fade to russet, and in winter to straw. The patches of samphire, or picklegrass, soft green in summer, turn red or even scarlet in fall.

BIRDS: MORE CHARACTERISTIC SPECIES

The discussion of the birds of the salt marsh may be divided into two parts, the first relating to birds that either breed in or closely frequent the usual salt-marsh vegetation, and the second treating those kinds that visit the marshes but do not breed in them, unless it is in trees that are not really a part of the salt-marsh vegetation. This second section includes also birds whose true breeding home is in inland wooded swamps or on bare

beaches and islands, but which may frequently fly over or even descend to feed in salt marshes. Birds of the first classification are the "more characteristic species". Birds of the second are treated under the heading "Less characteristic species" (p. 10).

Rails

A bird family highly characteristic of the salt marshes is the rail, and the most representative member of the family is the clapper rail, known also as marsh or meadow hen. While rails abound in salt marshes, a casual observer might spend considerable time in these areas and never see one, for they are retiring and elusive and are most active in the morning and evening hours when the transient observer is least likely to be in the marshes. By going at those times, however, or by proceeding cautiously and quietly at others, the bird watcher may occasionally have an opportunity to see rails.

All of the group are narrow-bodied birds that slip about among the dense vegetation of the salt marsh so readily that capture by direct pursuit probably is not within the power of any of their enemies. The clapper rail, about the size of a third-grown leghorn chicken, is largely grayish, with some olive on the back and buffy on the breast. It is always in the salt marshes, passing even the winter there, from New Jersey southward. The king rail, while chiefly an inhabitant of fresh marshes, occasionally is seen in the salt. It is of about the same size as the marsh hen, but is darker above and much more reddish brown below. The Virginia rail, half the size of the king rail, and of about the same general coloration, has a distinctly reddish patch on each wing. It may be seen in the salt marshes at all seasons, but more often in winter.

The sora, a little smaller than the Virginia rail, is mostly olive-brown above and blue-gray below, with a black marking over the crown, about the base of bill, and on the throat. It is chiefly a fresh-marsh species, but may sometimes be seen in the salt marshes, and winters in them from the Carolinas south. Two smaller species, the yellow rail and the black rail, and thus sufficiently described, inhabit the marshes, but they are so rare or elusive, or both, that they are seldom seen.

All the rails have light and dark barring on the flanks. They tend to be most active in the evening, and the marsh then may resound with their distinctive calls. Their nests are on or near the ground, or supported just over the water, and are usually well concealed. The eggs are pale with dark spotting and often are laid in considerable number, clutches varying from 5 to 15.

The food habits of the rails have not been much studied. The sora habitually fattens in wild-rice marshes (fresh), in fall, and the other species, except the clapper rail, frequent these areas to some extent. Rails are known to feed on insects, snails, and small crustaceans, the clapper rail being reported to devour many fiddler crabs. Rails are protected by law, but as they are classed as game birds an open season is provided for hunting them.

Sparrows

Another group of birds that are just as characteristic of the salt marshes as the rails, and just as elusive, but much smaller, are the sharp-tailed and seaside sparrows. Like many other sparrows they tend to be streaky both above and below, and they have touches of yellowish on the sides. They are about as difficult to observe as mice and appear not unlike those small mammals during the brief glimpses that are about all that can be obtained of them. When forced to take wing they flutter only a short distance, and drop again into their haven--the marsh. Their songs are brief and unimpressive. Their nests are built in crannies among drift, often of dried eelgrass. The sharp-tailed sparrow and the seaside sparrow feed on insects, spiders, snails, and sand fleas, which make up about four-fifths of their food. The seeds of grasses and other plants constitute the other fifth. These sparrows are in the marshes at all seasons, but there is some shifting to the southward, at least of the northern colonies.

Ducks

As further species that breed in the salt marshes, the black duck, blue-winged teal, bittern, willet, marsh hawk, red-winged blackbird, and the marsh wren may be mentioned. The birds that nest on beaches and sandy islands are not considered here, though many of them that feed in, or otherwise resort to, salt marshes, will be referred to later.

Black ducks are heavy-bodied birds of prevailing dark color, with the lining of the wings white, a character well shown in flight. The female, though smaller than the male, does the talking for the family, having a loud harsh quack, of which the male's softer note seems a faint echo. Black ducks are usually seen in pairs, and in flight the female leads the way, the male following her every turn and twist.

The blue-winged teal is but little more than a third the bulk of the black duck. The male has a conspicuous white crescent in front of the eye, and both sexes have a large blue patch on the wing, which shows well in flight when the light is favorable. The female utters a low quack, and the male a whistling peep. Both species make their nests of a variety of dry plant fragments, line them with their own down, part of which is dragged over the eggs when the sitting bird leaves of its own accord. The number of eggs, which are white or buffy, varies from 5 to 15.

Both of these ducks breed in the salt marshes from Virginia north. Black ducks may be seen along the entire coastline in winter, and the blue-winged teals from Maryland southward.

The food of the black duck is about three-fourths vegetable and one-fourth animal. Pondweeds, including both the eelgrass and the wigeongrass of salt and brackish water, are the most important vegetable foods, followed by the seeds of grasses, sedges, and smartweeds. About half the animal food consists of small snails and mussels, the common blue mussel being frequently taken. Sandfleas, shrimp, crabs, insects, and small fishes, and fish eggs, also are eaten.

The blue-winged teal takes about seven-tenths vegetable and three-tenths animal food. Sedges, pondweeds, grasses, and smartweeds, furnish most of the vegetable food, and snails, insects, and crustaceans the bulk of the animal subsistence. These birds rarely cause damage to man's interests through their feeding habits, and they are important representatives of the wild-fowl group that almost as a whole has been so reduced in numbers in recent years as to demand the most careful protection.

Bittern

The common bittern seems to be the only one of the heron tribe that nests in salt marshes of the Atlantic coast. An obvious reason is that it regularly nests on the ground, while the others usually build in trees. A rude platform of matted vegetation suffices for a nest, and in this the hen bittern deposits usually 4 to 6 pale brownish eggs. The bittern is light brown above and streaked with that color and white below. It has a habit of "freezing" in an erect position when surprised, thus looking quite stick-like. Its strange notes of the mating season have earned it some interesting names as dunk-a-doo, thunder-pump, and stake-driver. This call given during spring evenings, when heard distinctly, sounds like plunk-a-lunk, but when coming from a distance, or when indistinctly perceived, seems like lunk, lunk, suggesting the name stake-driver. The bittern does not depend on fishes for food to so great an extent as commonly supposed, but takes considerable numbers of crawfishes and other crustaceans, and even a good many mice. It breeds from the Carolinas north and winters from Massachusetts south, though uncommonly at the extreme of these seasonal ranges.

Willet

The willet is a rather large bird of its group, that of shore birds, which includes the snipes, sandpipers, plovers, and allies. It is 14 to 16 inches long and has a wing spread of 24 to 29 inches. It is gray above and white below, very plain colors, but is recognizable on the wing, and with upraised wings as it alights, by a broad white band extending the whole length of each wing. The bird is sometimes noisy, and one of its common calls, an oft-repeated pil-willet, shows that it is one of the birds that have named themselves. The nest is a slight hollow lined with grass; the number of eggs is 4 (the standard number for shore birds), and their color variable, white to olive, spotted with brown to purplish. The willet breeds from New Jersey, and winters from South Carolina, southward. Its food is reported to be insects, mollusks, and crustaceans, and small fishes, together with a slight admixture of vegetable material.

Marsh Hawk

The marsh hawk is easily recognized, being the only member of its group likely to be seen in Atlantic-coast salt marshes that has the rump white. This character has given a related European species the name of ring-tailed hawk. The marsh hawk appears to fly somewhat lazily about, usually not far above the cover it is beating, and into which it drops at any chance of catching prey. It may be seen in all Atlantic-coast salt marshes at all seasons. It feeds in about equal proportions on mice and

birds but takes a variety of other small creatures also and is not averse to partaking of carrion. In some cases, from man's point of view, its numbers may appear to be in need of control. The nest may be only a flattened place in marsh vegetation, but sometimes is built up a little with sticks or other material. Usually 3 to 6 eggs are laid, bluish or greenish white, sometimes faintly spotted.

Red-winged Blackbird

The red-winged blackbird inhabits the whole United States, so perhaps needs no introduction, other than calling attention to its bright red, yellow-bordered epaulets, and its gurgling okalee call. This is uttered at almost regular intervals by the males in spring after they have reached the breeding grounds and "staked out a claim", where they await the coming of their mates. Redwings may be seen along the entire coast line in summer, and from Massachusetts south in winter. The bird is distinctly migratory, however, and the summer and winter populations of a given area no doubt are almost always different groups of individuals. The female is smaller, brownish-black above, and more or less buffy and dark streaked below. The sexes share a chuck note which is uttered often. This blackbird often builds its grassy nest among the stalks of marsh plants, but sometimes also in bushes. The eggs, 2 to 5 in number, are pale bluish green, spotted, blotched, and scrawled with brown to purplish. When scattered, redwings probably do more good than harm by their feeding habits, but they often flock in great numbers after the breeding season, and when so congregated, their visits to grainfields may be disastrous and call for control measures.

Meadow Lark

The meadow lark, a plump bird, brownish above, yellow below, with a black crescent on the breast, and white feathers on each side of the tail showing plainly in flight, may be found in the marsh-hay zone of the salt marshes in winter, and it breeds in it from Virginia north. It is sometimes called "marsh quail", and formerly was considered a game bird. It is a highly insectivorous species, however, and deserves protection, except on forays into fields of sprouting corn, peas, and peanuts, and into ripening tomatoes in the South during its spring migration. Permits to shoot the birds under such circumstances have been granted, but in general the meadow lark well merits the legal protection it receives. Grasshoppers, beetles, bugs, and caterpillars are the leading kinds of animal food eaten. The meadow lark builds its nest in grass, usually leaving an arch of vegetation over it so that it is not easy to find. The eggs are 3 to 7, white, blotched, and speckled, with brown, purple, or lavender.

Marsh Wren

Marsh wrens in various slightly differing forms breed in suitable places throughout the country and winter sparingly from New Jersey south. Atlantic-coast salt marshes are favorite haunts, especially those parts consisting of cattails. Like all wrens these little birds are the embodiment of restless energy, and they sing over and over a hurried series of bubbling, lilting notes. Besides the globular nest woven among and largely composed of cattails, and lined with their down, in which the 5 to 10

pale brown to chocolate eggs are laid, the marsh wren builds various extra dummy nests which, unless used as sleeping quarters for the male, seem of no use except to keep that tireless fellow busy in their construction. The food of marsh wrens seems to be a fair sample of the insects and other small organisms of their highly aquatic environment.

BIRDS: LESS CHARACTERISTIC SPECIES

Most of the common birds of the eastern United States may occasionally be seen in or about salt marshes. The number to be treated in this relatively brief account must be restricted, however, to the most frequent or conspicuous visitors.

Herons and Egrets

All our herons, for instance, frequent salt marshes more or less, and besides the bittern, previously described among the more characteristic birds, the great blue heron, little blue heron, green heron, Louisiana heron, and night heron and the egrets may from time to time come to notice. All herons fly with the neck drawn back and the legs extended behind. The great blue heron may occur in the salt marshes at all seasons. It stands about 3½ feet high, and when in the air flaps its large wings slowly with an undulatory motion that is characteristic. The great blue heron is an expert spearer of fish, but on the whole takes more of the noncommercial than of the commercial species, if for no other reason than that the former are more common. A good many great blue herons are killed under permit about fish hatcheries and rearing ponds, but it would be better, where at all feasible, to screen the ponds. Shooting these herons at the breeding colonies is indefensible. It is moreover illegal, as the birds are protected by Federal law.

The little blue heron is about half the size of the great blue heron, and when adult chiefly dark slate blue, while the larger bird is grayish blue. Young of the little blue heron, which wander north late in summer, are often white, but intermediate, spotted forms also occur. The dark bill and the smaller size of the white phase distinguish it from the large egret, and the greenish legs and dark feet from the small egret.

The egrets are white, the large egret with a yellow bill, and the small egret with yellow feet, points that must be seen to insure positive identification. The former is about two-thirds, the latter about one-third the size of the great blue heron. Late in summer the little blue heron may be seen almost anywhere along the coast, but in winter and early summer as a rule only from North Carolina southward. The large egret breeds from New Jersey south, wanders extensively in summer and early fall, going north even into Canada, and retires in winter to the Gulf coast and southward. The small egret also formerly bred as far north as New Jersey, but now nests from North Carolina southward. Like the other species, it wanders in summer and about to the same extent; then it returns to the breeding range for winter quarters.

The egrets formerly were especially persecuted for their plumes, or aigrettes, a practice that has not yet been entirely suppressed. It has

been stopped to such an extent, however, that the birds have come back from numbers that were approaching the disappearing point to relative abundance, the large species recovering more rapidly than the small. In the first stages of the recovery process the birds resumed their northern wanderings in steadily increasing numbers and to more and more distant points, and later they reestablished breeding colonies at points farther and farther to the north where they had formerly bred. The contraction of their populations to the south as their numbers decreased is an interesting phenomenon, as the northern colonies were the least molested, the war of the plume traders upon them being most intensive in the South.

The Louisiana heron, which is of about the same size as the little blue heron, may be seen from the Carolinas south. Standing, it appears more slender than other herons; on the wing, the dark head and neck, contrasting with the white body, distinguish it. The green heron, the smallest of the tribe here described, is about the bulk of a crow, and appears dark, although it is greenish above and reddish below. It frequents bodies of water in woodlands but may occasionally visit salt marshes. It winters from South Carolina southward.

The black-crowned night heron may be seen anywhere along the coast in summer and from Virginia (casually from Massachusetts) south in winter. In this species the bill is proportionately thicker at the base than in other herons; the top of the head is black, and the general body color bluish gray; the young in their first winter are grayish brown, spotted and streaked with whitish and rusty. Night herons nest in colonies in trees, often near the coast, may visit salt marshes at that season in search of food, and at other seasons may adopt the marshes as hunting grounds for protracted periods.

Besides the bittern, the vocal accomplishments of which already have been mentioned, other herons attract attention by peculiar and usually harsh notes that in a number of cases have suggested local names for the species. When startled the great blue heron gets under way with raucous croaks and squawks, sounding much like "cussing", and in some places it has, therefore, been called "cranky". The green heron under similar circumstances arises with a skeow, which earn it such names as "scouck", "scout", and "cow-cow". The night heron often cries quock, and so has been termed "quawk", "wop", and "qua-bird".

Gulls, Terns, Skimmers

Gulls and terns breed chiefly on islands and beaches, but they are free-flying fowl, and several kinds may from time to time be seen in the salt marshes. Some of these birds are rare or difficult to distinguish, and are best omitted from an account like the present. The most common species on the Atlantic coast is the herring gull or harbor gull, the common sea gull. It is somewhat larger than a crow; the back and most of the wing are pearl gray, the head and underside and tail white, and the tips of the wing barred black and white. It breeds from Massachusetts north and west and winters along the whole coast, from which in fact it is entirely absent only a few weeks in summer.

A very similar appearing but somewhat smaller species, the ring-billed gull, can be surely identified in the field by the novice only by the black crossbar near the tip of the bill.

The laughing gull and Bonaparte's gull are common representatives of another group--the black-headed gulls. Adults in breeding plumage are easily recognized; but in winter the black on the head mostly disappears, and the young do not attain the full breeding plumage until the second spring after the year in which they were hatched. In this group the laughing gull is a little larger, with the back and wings leaden gray, the Bonaparte's gull a little smaller, with the back and wings pearl gray, and the bill more slender. The laughing gull breeds along the whole coast line and winters from the Carolinas south, while the Bonaparte's gull breeds in the northern interior part of the continent, and winters from Massachusetts southward.

Gulls along the coast in winter feed on almost any available thing, hence figure largely as scavengers. They take insects, however, as well as mollusks, crustaceans, and fishes. They rarely dive so are not well adapted to catching live fishes. On the Maine coast herring gulls increased so much that they became objectionably destructive to eggs of other birds and to fishes, clams, and blueberries, and steps have been taken to control their numbers.

Terns have the bill more slender and pointed, as compared with the stout bill with downcurved tip of the common gulls, and on the wing they point the bill more directly downward. Expert as gulls are in flight, they are surpassed in this respect by terns, which on account of this skill are commonly called sea swallows. All the terns when adult have the top of the head black and even in immature plumage have a broad dark line from the eye back around the nape. The crown feathers are more or less elongated so as to form a slight crest posteriorly. The birds are mostly pearl gray in color and have the tail more or less deeply forked.

The least tern, less than 10 inches long, is the only tern that in summer has a bar of white on the forehead in front of the black cap. It breeds on islands and beaches from Massachusetts south and winters from the Gulf coast southward. Terns 14 to 16 inches in length include the common tern and Forster's tern, too near alike for field identification. Both occur along the coast in migration. The common tern breeds in New England, and both winter from the South Atlantic coast southward.

The Caspian and royal terns are another pair of similar appearance. They are larger birds, about the size of crows, with reddish orange bills; the royal having the tail about twice as deeply forked as the Caspian. Both may be seen on the South Atlantic coast in winter, and both breed north to Virginia. The Caspian tern is seen farther north in migration to and from breeding grounds in the northern interior.

The black tern, easily recognizable by its generally sooty color, is a rather rare migrant on the Atlantic coast. It breeds chiefly inland.

Terns scarcely ever share the carrion-eating propensities of gulls, but capture their prey alive, either on the wing, or if in water by plunging. Small fishes, shrimp, and aquatic insects are taken by partial diving, and a variety of insects by sweeping them out of the air. The black tern is more pronouncedly insectivorous than the others.

All the gulls and terns here mentioned are protected by Federal law.

The black skimmer, related to terns and as large as any of our species, is a peculiar and striking bird that may sometimes be seen about salt marshes. It breeds on beaches and bare islands as far north as New Jersey, and winters from Florida (occasionally South Carolina) southward. It is dusky brown above, with the forehead, lower parts, and the hind border of the wing feathers as seen in flight, white. The bill, its most peculiar feature, is much longer than the head, flattened from side to side like a knife, with the lower part projecting considerably beyond the upper. The bird often flies close over the surface, with the flattened bill ploughing through the water, a habit that has suggested the names "cutwater", and "shearwater". The food is small fishes, so far as known of kinds not used by man. Skimmers are wonderfully good fliers, and flocks carry on elaborate maneuvers in swift unison. One is tempted to call the flocks "packs", as a common call of the birds sounds like the yelping of dogs.

Ducks, Geese, Swans

Breeding ducks of the salt marshes include, as previously mentioned, the black duck and the blue-winged teal. In migration a large number of additional species may be seen for which in this leaflet it is hardly practicable to detail recognition marks. These can be recognized as ducks even by those with the least ornithological experience. They are the precious survivors of a very important group of American birds, now so greatly reduced in numbers that some of the species are in danger of being exterminated and all need earnest and sympathetic attention.

The mergansers, or fish ducks, not being hunted, have held their numbers better; and, because of its preference also, the red-breasted merganser is likely to be seen in salt water. Its narrow saw-toothed bill and crested head, though shared with other mergansers, are characteristic. The male has a greenish black head and back, white neck and wings, a reddish brown and spotted upper breast, and finely barred black and white sides. The female and young are much plainer, with the head and neck cinnamon, and the back grayish brown. It may occur in winter anywhere along the coast, but in the East does not breed south of Massachusetts.

Two of the goose tribe should be mentioned: the Canada goose and the snow goose. The Canada goose is mostly brownish gray, the underparts paler, and the head and neck black, with a well-marked white throat patch. This is our most common goose, and because it breeds mostly far to the north away from man's influences and has great natural sagacity and wariness, it has held its numbers very well. It is the species usually seen flying in V-formation, as it migrates more by day than do the others. Its well known call

has given it the name of "honker". Canada geese usually weigh from 8 to 12 pounds. They may be seen along the whole coast in winter, being rare to the extreme south, however.

The snow goose, a little smaller than the Canada goose, is white with black wing tips. It nests far north and winters on the Middle Atlantic coast, being seen as a migrant or straggler, however, both north and south of that section. The main body of these birds spends the winter in the sand-dune country along the coast of Virginia and North Carolina, where they arrive and from which they depart almost in a body. These geese do not spend much time in or about the water, a habit that has protected them from gunners. Their whole population is concentrated in a limited area, however, and they have consequently received complete legal protection ever since enactment of the Migratory Bird Treaty Act in 1918. Geese are grazers, cropping to a considerable extent the stems and leaves and also digging up the roots of grasses and sedges. This has enabled the snow goose to stick to its sand hills, where it finds food readily obtainable and enjoys a great degree of safety from hunters. The Canada goose grazes extensively, but it spends much time on the water and consumes a great deal of aquatic vegetation.

A larger, long-necked, entirely white-feathered, bird that may be seen is the whistling swan. It winters chiefly from New Jersey to North Carolina, but is occasionally seen in migration northward, on the way to and from its Arctic breeding grounds. Most of the swan population of eastern North America concentrates on the Middle Atlantic coast in winter, a habit that would be fatal if hunting were permitted. The birds have accordingly been strictly protected since 1918.

Shore Birds

About 40 kinds of shore birds, one of which, the willet, has already been discussed, occur on the Atlantic coast. The really coastwise species characteristically migrate along the outer beaches and are seldom seen in salt marshes even though they are so near. The case is an interesting example of habitat preference, and as a rule it will be found that the beach birds avoid the marsh, and the marsh inhabitants are seen but little on the beach. In the marsh are most likely to occur the yellowlegs, dowitcher, pectoral sandpiper, and least sandpiper. The two species of yellowlegs are colored alike, first in being true to their name, the long legs being bright yellow, and secondly in being dusky, speckled with paler above, and whitish, more or less streaked or marbled with dusky below. Their bills are of moderate length (1 1/3 times the head) in proportion to the size of the birds. The greater yellowlegs is 12 to 15 inches long, and the lesser yellowlegs 9 to 11 inches long. Neither bird breeds on the Atlantic coast, but both may be seen there in migration. The greater yellowlegs winters from South Carolina southward and the lesser yellowlegs entirely south of the United States. They are easily alarmed and take to wing uttering repeated loud, ringing, whistling cries, a habit which in old hunting days gave them the name of "tattlers".

The dowitcher is a plump-bodied bird, with the bill more then twice as long as the head. In spring the under side of the body is largely cinnamon, and in winter gray; the rump is largely white, and the tail barred black and white. The dowitcher is far less excitable than the yellowlegs, and may sometimes be closely approached. Dowitchers remain by preference in compact flocks and probe the mud industriously with their long bills.

The pectoral sandpiper, or grassbird, 8 to 9½ inches in length, is a particular habitue of areas of short grass, soppy with water. The bill is a little longer than the head, the top of head streaked brownish black and light chestnut, the back feathers brownish black edged with paler, the upper breast pale brownish streaked with dusky, and the belly and rump white; the middle tail feathers are darker than the others. A note given by the bird when flushed "kriek, kriek", has suggested one of its local names, "creaker". It is seen on the Atlantic coast only in migration.

The least sandpiper, or mud peep, 5 to 6 3/4 inches in length, frequents muddy beaches everywhere and is often seen in salt marshes. It sometimes assembles in large flocks. There are several small sandpipers of very similar appearance, but it is impracticable to differentiate them here, though a common one on mud, with greenish yellow legs and a slightly down-curved bill, is likely to be the least sandpiper. It does not breed in Atlantic Coast States, but occurs in all of them in migration and winters from North Carolina southward.

The spotted sandpiper, although chiefly a fresh-water associate, is so universally distributed that individuals at times are likely to visit salt marshes. This bird, 6½ to 8 inches long, is grayish brown above and white below, marked with round dark spots. These distinguish it from any other shore birds. This sandpiper is constantly bobbing and is on that account widely called "teeter-tail". It usually cries "peet-weet", when taking flight, and with down-curved wings alternately flaps and sails, usually not far before alighting again. It frequents both wet grassy or muddy areas.

It was pointed out by the writer in 1911 (Biol. Surv. Circ. No. 79, p. 9) that shore birds deserve protection by their beneficial feeding habits. Where local conditions permit, the birds are highly insectivorous, feeding on grasshoppers; caterpillars, including such pests as cutworms, armyworm, and cotton worm; and beetles, including billbugs and wireworms. Adults and larvae of both horseflies and mosquitoes are eaten; hundreds of mosquito "wigglers" have been found in single stomachs. Water beetles and their larvae that prey upon small fishes, marine worms that devour oysters, ticks that carry cattle fever, and crawfishes that are destructive to crops and embankments, also are consumed by shore birds. Shore birds not only thoroughly deserve protection, but must have it to exist. They lay only 3 or 4 eggs, with only one laying a year, so that probably only one or two young are reared. Most of them perform long migrations beset by hazards, and many of them migrate along narrow routes in which their whole populations are concentrated and where they would rapidly be killed off if exposed to attack by the army of hunters we have today. Shore birds, with the exception of a few species, have been protected at all seasons ever since the passage of the Migratory Bird Treaty Act in 1918, and, despite some poaching, have responded encouragingly to protection. Without it, many of the species would now be extinct.

Hawks and Eagles

The osprey, or fish hawk, breeds all along the coast and winters from the Middle Atlantic States southward. The nests are bulky, and frequently placed on tall stubs, though a variety of other sites are sometimes occupied. The eggs, usually 3, are from white to reddish brown, heavily spotted with deep brown. The fish hawk is a rather large bird (length, 21 to 25 inches; spread, 54 to 72 inches), dark above, pale below, with a good deal of white about the head. The tail and wing are chiefly barred, dusky and white. The wings are long and distinctly elbowed in flight. The bird hovers over the water and plunges in after its prey, which consists almost entirely of fishes, though as a rule those obtained are chiefly noncommercial varieties. Without regard to that fact, it has long been looked upon with favor by fishermen, a fortunate circumstance. The osprey is specialized to get its food from the water, and it will not come to the ground even for prey it has accidentally dropped. There seems little likelihood, therefore, of its preying upon poultry, rabbits, or other similar landlubbers.

The bald eagle lives almost completely throughout North America, and probably breeds near, if not in, salt marshes, for it is largely a coastwise bird. It is larger than the osprey, being 30 to 34 inches long with a spread of from 72 to 85 inches. The adults are dark brown, with the entire head and neck and tail white. The wings are broad and long, are flapped rather slowly, and are much used also in soaring. The young lack the white head and tail and are chiefly dark, though some present a blotched appearance. Their size and similarity to the adults in action and habits, however, will identify them. The nest usually is larger and placed in a higher tree than that of the osprey. The eggs, usually 2, are yellowish white. While an expert in flight and powerful enough to capture almost any of the forms of wildlife on our coast, the bald eagle is by preference a scavenger. Dead fish and other animals it finds on beaches and mud flats are its most common food, though crippled wild fowl are soon found and despatched, and a certain proportion of living prey is taken. The eagle has long been reputed to harass the osprey until it drops its catch, which the eagle then recovers and devours, but according to the writer's experience, this must be an uncommon performance. The bald eagle does little harm to healthy wildlife, is a magnificent bird, a master of the air, and the embodiment of wild freedom. It should be preserved forever for its own sake, as well as because it is the National Emblem.

Crows

Crows need no description. Two kinds visit the Atlantic-coast salt marshes, but they are not readily distinguished by the inexperienced. The upland crow, of almost continental range, averages somewhat larger than the coastal fish crow, however, and appears of sturdier build, particularly as to the chest, head, and beak. It is more accustomed to long flights, and as a rule goes directly on its way with steady sweeping wing beats. Its caw is hoarser and more guttural. The fish crow has a more vacillating flight, and a higher pitched and nasal car. The fish crow resides along the

coast and the estuaries of larger streams, while the upland crow usually is only a visitor there. The fish crow occurs regularly as far north as Connecticut, but is only a straggler beyond that State. It is more common southward. Crows eat almost anything, and the upland species is sometimes quite injurious to crops. The fish crow has little contact with farms, but shares with its inland relative a fondness for the eggs and young of other birds that sometimes seems too pronounced from man's point of view. In the salt marshes, undoubtedly a high percentage of the eggs eaten by the crows are those of the clapper rail, or marsh hen, and it has never even been suggested that the numbers of that bird are thereby reduced. Under some conditions, as after the flooding of nests of clapper rails and other birds in salt marshes by exceptionally high tides, eggs are washed out in windrows, and then their consumption by crows has no bad significance. The writer has heard crows condemned on account of the number of eggshells under their nesting trees, when it was perfectly evident that most of these were from drowned-out nests of the clapper rail. This is said in extenuation of crows because of the prevalence of immoderate condemnation. The lesson is to observe carefully to find out all possible about crow-egg relationships, or for that matter about any wildlife problem before taking any action. Then there should be done what seems necessary but no more.

Kingfisher

The kingfisher will come to salt marshes where there are bare limbs, stakes, or other exposed perches. This slaty blue bird (11 to 14 3/4 inches long) has a ring around the neck, underparts chiefly white, and a well-defined erectile crest. The bill is stout and longer than the head. A cinnamon band across the breast below the slaty blue one possessed by both sexes marks the female. The bird frequently utters a loud, harsh, rattle. It breeds in holes in banks, from southeastern Canada to South America, and winters along the coast from Massachusetts southward. It captures fishes by plunging for them, and its fishing in salt marshes probably does little harm. The bird must, however, be controlled about fish hatcheries and rearing ponds. This is usually done by shooting or trapping, but screening all ponds of moderate size would be preferable.

Grackles

The boat-tailed grackle, almost universally called "jackdaw", is a bird of the coast from southern Delaware southward. The male is mostly black, with bluish and greenish reflections, while the female is chiefly buffy brown, with wings and tail darker. The male measures 15 to 17 inches, of which more than a third is tail; the female is smaller, 12 to 14 inches. The tail is trough shaped, a character particularly well displayed in flight. These birds feed a great deal about salt marshes, are not afraid of the water in which they wade, and submerge their heads in search of shrimps, small crabs, and snails. They eat crawfishes and insects also and occasionally damage grainfields near the coast. Jackdaws are quite noisy, making a variety of harsh, guttural, calls. The purple grackle, an inland species, somewhat smaller, with the sexes more nearly alike in dark and metallic coloration, may sometimes visit the marshes and be seen in company with the boattails.

Cormorants, Pelicans, Ibises

Several water birds frequenting the South Atlantic coast may be briefly mentioned as they may occasionally be seen in salt marshes. The double-crested cormorant, "shag", or "nigger goose", is a glossy, greenish black bird, somewhat smaller than the Canada goose, and rather heavy in flight. The birds characteristically fly in single file. They spend much time perched, for purposes of drying and preening, and when quiet suggest so many large black bottles. They are expert fishers and can catch almost anything they want. In some places they are destructive, but on the whole consume more of the less valuable fishes than game and commercial species. The double-crested cormorant winters from Virginia (sometimes from New Jersey) southward, but a related race is resident all the year in Florida.

Almost everyone has read about pelicans, or seen pictures of them, so that recognition of the birds in life will not be difficult. The brown pelican winters on the Florida coast and may be seen in summer as far north as South Carolina. These birds characteristically fly in files, alternately flapping and gliding. Fishing is an individual performance, and the birds plunge--almost, it would seem, awkwardly fall--into the water when a fish is spied near the surface. Brown pelicans subsist very largely on menhaden, thread herring, and other fishes not used for human food. Of the food fishes they probably take more mullets than any other kind.

The white ibis (24 to 27 inches long) an almost entirely white bird but with black wing tips, and a long, down-curved, reddish bill, breeds from South Carolina, and winters from Florida, south. It is usually seen in flocks and on account of the curved bill is often called curlew, a term preceded by such modifiers as white or Spanish. The wood ibis, a much larger bird (35 to 37 inches long), may be seen, both winter and summer, from South Carolina southward. This bird also is mostly white, but the flight feathers and tail are dark and the head and upper neck are unfeathered and scaly. The ibises differ from herons in flying with the neck as well as the legs stretched out.

Warblers and Swallows

Two small land birds are likely to be common enough in winter near or in southern salt marshes to attract attention. One, the myrtle warbler, a little less than 6 inches long, is chiefly bluish gray above and white below, streaked with black, and with the crown, the rump, and a spot on each side of the breast, yellow. These attractive little birds winter regularly from New Jersey (casually from New England) south, and sometimes swarm near the coast from the Carolinas southward. They frequently utter a characteristic and rather loud tchip. The myrtle warbler feeds to a considerable extent on the fruits of the bayberry or wax myrtle, a habit alluded to in the standard vernacular name. This is an unusual habit for one of the warblers, a highly insectivorous group of birds, but it enables the myrtle warbler to winter farther north than any of its relatives.

A remark to the same purport is in order relative to the tree swallow, and the berry-eating habit seems even more remarkable in its

case. The tree swallow is glossy bluish green above and white below; like others of its tribe it goes much in companies and is expert in flight. It is seen in winter regularly as far north as North Carolina, and occasionally to New Jersey.

Both the warbler and the swallow consume insects whenever they are available, and feed chiefly on them during the warmer months, as do all of their kin. Birds of these families are legally protected throughout the Union.

OTHER WILDLIFE

Birds are a more prominent element of the wildlife of marshes than are some other groups, no doubt because of the ease with which they come and go--they do not have to stay but are free to visit. Temporarily frequenting a salt marsh is something very different from living there permanently. To reside there requires close adaptation; and, as we have seen, relatively few birds are fitted for exclusive residence in salt marshes. The same is true among other kinds of wildlife, and one important group, the amphibians (toads, frogs, salamanders, and the like), are totally banned because their tender skins will not endure salt.

Reptiles

Comparatively few reptiles penetrate the salt marshes, though of course a number may be found near the landward edge (this is true of the amphibians too), where conditions may become radically different in a short distance. The alligator, which all will recognize on sight, occasionally sojourns in salt water and at times, therefore, may be seen in the marshes. The normal range of the alligator is from North Carolina southward, but a few, possibly escaped from captivity, have been found as far north as New Jersey. Alligators deposit their eggs in layers in mounds of muck and vegetation scraped together by the female, and owing to the heat produced by the rotting of the vegetation, these serve as incubators. The animals usually have individual deep holes or dens under water. They feed on crabs, crawfishes, water insects, fishes, turtles, and sometimes larger creatures. There are old records of alligators 20 feet long or more, but at the present time a 12-foot animal is a very large one and 15 feet about the limit of verified size. Their numbers have been greatly reduced by hunting for the hides, which are used extensively by the leather industry in the making of traveling bags and in ornamental leather work.

The diamondback terrapin is a natural denizen of salt marshes from New Jersey southward. Its not very fitting name is suggested by the concentric ridging of the plates of the carapace, or upper shell. This turtle is plainly colored, greenish to black. It is the favorite catch for turtle stew, and has been so hunted for the market that it is rare in most localities. Some success has been attained in raising diamondbacks in captivity.

The cottonmouth moccasin, a dangerously poisonous snake, is semi-aquatic and a good swimmer, apparently unafraid of salt water, and may be found along the coast from North Carolina south. Its general color is dark chestnut-brown with some darker barring and with the throat and some slight stripes about the head yellowish white. The common name of this

snake refers to the white lining of the mouth, which it is said, the snake displays briefly before biting. The cottonmouth has a triangular form of head distinctly wider than the neck, which is characteristic of most of our poisonous snakes. This is a useful mark for separating it from large dusky individuals of the common water snake, which may look surprisingly like a dully colored cottonmouth moccasin. Cottonmouths may attain a length of 4 feet and are of stocky build. They are not aggressive, and most cases of snakebite in which they are involved are due to stepping on unseen individuals. Emergency treatment involves the placing of a tourniquet between the wound and the heart, loosening it for a minute or two every 10 or 15 minutes, cutting open the wound to secure a good drainage, and removing as much of the venom as possible by suction. This should be done with a stout rubber bulb, not by the mouth, unless there is no other way, as the venom may be absorbed through abrasions in the lining of the mouth. Full information about treatment of snakebite is contained in a leaflet mentioned at the end of this leaflet.

Fishes

It is not in the province of this leaflet to treat of the fishes of salt marshes, but it should be mentioned that the waters of these marshes harbor large numbers of certain small fishes that are known to devour many mosquito larvae, or "wigglers". They include the moderately stout killfishes of several kinds, mostly greenish, marked with dusky and pale cross bands. They vary from 2 to 6 inches in length, when adult, and occur in one form or another along the whole coast line. The pursy minnow, also with faint cross bars, is higher bodied, more the shape of a sunfish. The male is bluish above, coppery below, and the female olivaceous. These minnows are 2 to 4 inches in length and are found from Cape Cod southward. Another mosquito-devouring group is the silversides--slender, translucent greenish fishes, with a silvery streak along each side. Their maximum length is about 5 inches, and they occur along the whole coast line. Drainage of salt marshes is sure to interfere greatly with the distribution and good work of these little fishes, but any arrangements that can be made in their favor, such as leaving pools that will receive water at every tide, but clean-edged so that the fishes can find every "wiggler", will not be in vain.

Mammals

No mammal or fur bearer inhabits salt marshes exclusively. Muskrats and meadow mice may live in the marshes at all seasons but in colonies that are only outliers of a very extensive inland range. Meadow mice, or field mice, inhabit the marsh-hay zone, and sometimes may be quite numerous. They are smoothly rounded little rodents, not even the ears sticking out of the fur to any extent, and with short tails. Their average length is about $5\frac{1}{2}$ inches for the body, $1\frac{1}{2}$ inches for the tail. Their runways are narrow, irregular, and intersecting, some beneath, some on the surface of the ground. They are easily observable on burned-over areas, or in spring after snow has melted away from the flattened vegetation. Meadow mice feed largely on vegetable materials and in salt marshes can do no harm. They are the most frequently captured prey of a number of kinds of hawks and owls.

In form muskrats are not unlike meadow mice, but they are about 2 feet long, of which nearly half is the bare, laterally compressed tail. The animals live in areas where bulrushes and cattails are abundant, feed upon all parts of these plants, and use them as materials for their winter lodges. These are low conical mounds, substantially built, and standing high enough above the water line to provide ample space within for a dry grass-lined living room. From it several passageways lead off in different directions under water. Muskrats are heavily trapped for fur, which ordinarily has a good valuation, considering their abundance.

Occasional visitors to the marshes include the otter, the mink, the raccoon, and the opossum, all probably well enough known for there to be no question as to identity.

CONSERVATION

Conservation means different things to different people. Some think of protecting only things that can be used, and here again there is more than one school of thought--at least, of action. One protects only to the date of use and takes what it wishes without planning for replacement. (This has been compared to mining.) The other strives for replacement, so that there can be sustained use. (This has been compared to crop production.) There is also protection for beneficial economic tendencies, without direct use--this principle underlying the protection of insectivorous birds. Finally there is conservation for its own sake, the goal of the nature lover.

Whatever his particular interest in wildlife may be, the nature lover is one who, consciously or not is impressed with the fellowship of all living things, a fellowship that is very real. All come from a single cell, all are made up of cells. Applied to the wildlife discussed in this publication, the likeness is even closer; all have skulls inclosing the vital brain, all have backbones and the same general bodily framework, and all have about the same organs, used in the same way and nourished with a flow of blood from an ever-faithful heart; they are indeed blood relatives.

It should never be forgotten that they share with us also the joy of living. No man can possibly get as much pleasure out of the water as does a porpoise, or an otter. Man, no matter how perfect his equipment, can never be attuned to flying like the terns, the swallows, and other birds whose pliant grace, in calm or storm, is beyond marvel. No man can be at home in a tree like a woodpecker, which born, cradled, and housed in trees its whole lifelong, must feel each evening when it comes for rest to its snug retreat that this tree, this nest, is the best and safest place in all the world.

That wildlife enjoys living in general as much as man, and probably in many ways even more, is a thought that should never be entirely out of mind. Man assumes dominion over wildlife and exercises it as he can, but in so doing he should as far as possible in the case of every creature, respect its right to existence, to its chosen home, and to undisturbed enjoyment of its way of life. As has been so often, but not too often, said, in following out our ideas for readjusting wildlife and its environment, we should do only what is necessary and no more.

References

More complete information on certain of the topics discussed in this publication is available in the following mimeographed leaflets that may be obtained from the Bureau of Biological Survey, U. S. Department of Agriculture, Washington, D. C.:

Poisonous Snakes of the United States (with recommendation of treatment for snakebites). (Bi-571.)

Food Habits of Fish-eating Birds. (Bi-1228.)

The present situation regarding eelgrass, Zostera marina. (BS-3.)